

dispersal of the mist the positive gas ions regain their mobility, and in consequence of mutual repulsion and aqueous convection currents, uniform distribution is re-established.

The positive envelopes attracted to and surrounding isolated negative clouds and their aqueous discharges, when they descend from the electron-charged upper air into the lower atmosphere, afford striking proof of the presence of positive ions in the latter.

The violent fluctuations seen as successive low clouds approach an observer can be interpreted in terms of envelopes and central zones or their precipitates. The unstable electrical systems so formed may result in electrical discharge along the surface of separation in the cloud, or the surface and the earth, according to circumstances.

For purposes of international comparison, all measurements of potential gradient should be excluded when mist, clouds, and locomotive drift are present. They are merely local phenomena.

I believe trustworthy readings are only occasionally obtainable within thirty miles of London, or five miles of a railway line. The Channel or Scilly Isles, or some south-western promontory, might provide a suitable site.

I do not doubt that curves plotted from such restricted data would show a nightly minimum and a daily maximum. If the natural potential is due to photoelectric ionisation of the air, with electronic concentration by diffusion in the outer low pressure regions, and a corresponding accumulation of positive ions in the lower, in a manner somewhat analogous to the diffusion potentials in electrolytes investigated by Nernst in 1889, the cessation of the process, and some recombination at night, and a maximum activity during daylight, are to be expected.

If homogeneity is as important a factor in long range electrical transmission as in acoustical, daylight ionisation may be partly responsible for the superior nightly reception by wireless at distant stations.

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Ultra-violet Radiations and Antirachitic Substances.

IN *Science* (1924, 60, 274) Kugelmass and McQuarrie published a preliminary account of experiments they had carried out which led them to think that substances like cod liver oil which possess antirachitic properties emit ultra-violet light on undergoing a process of auto-oxidation. Their technique was briefly as follows. The cod liver oil was made alkaline with caustic potash, and oxygen was bubbled through; the oxidised oil saturated with oxygen was then placed in a beaker, and over it was placed an air-tight photographic plate-holder made of lead containing a sensitised plate. The plate-holder had let into it two windows, one made of quartz and the other of glass. The face of the plate-holder containing these windows was placed directly over the oxidised oil, which was kept in the dark for twenty-four hours. On development the plate showed an image corresponding to the position of the quartz window. It was concluded that this effect was produced by ultra-violet radiations emitted by the oxidised oil since no image was produced where the glass window had been, and the possibility of direct chemical action was excluded by the plate-holder being air-tight.

Working independently, we have both failed to confirm this work. As Russell (*Proc. Roy. Soc., B.*, vol. 80) and others have shown, many substances

undergoing auto-oxidation will cause fogging of a photographic plate directly exposed to the material itself, and it can easily be shown that the reacting substance is a vapour obeying the laws of diffusion, etc. If care be taken to exclude this vapour or gas from coming into direct contact with the plate, no fogging will take place. We conclude, therefore, that either the plate-holders used by Kugelmass and McQuarrie were not gas-tight, or that their results are attributable to the quartz used as a window in their apparatus, for the following reasons.

We have observed that fused silica objects after exposure to ultra-violet light emit a phosphorescence which will fog a plate. Generally we have found that fused silica ware shows this property, and that optically worked articles do not; it being possible that this is due to the inclusion of small bubbles in the fused quartz. We have been privately informed that both Lord Rayleigh and Prof. E. C. C. Baly have previously observed the phenomenon, but but we have not been able to trace any statements about it in the literature.

The phosphorescence is really very remarkable if a piece of fused silica be exposed to the radiations of a quartz mercury vapour lamp for several minutes and then warmed to accelerate the emission in a darkened room. The important point from the point of view of the experiments we are considering is, however, that quartz which has been exposed to ultra-violet light may continue to emit rays capable of fogging a photographic plate after twenty-one days at room temperature.

We think it of interest to direct attention to this property of silica, especially as it seems to provide a possible explanation of the results of Kugelmass and McQuarrie, which we have been quite unable to confirm when we took care to use silica which was not emitting a phosphorescence.

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Luminescence of Solid Nitrogen and the Auroral Spectrum.

WITH regard to the statements made by Prof. McLennan in a letter to *NATURE* of January 10, I shall be glad if space can be afforded me for a few remarks.

1. From my first experiments of January 1924 I found that N_1 was a band extending between λ 5525 and 5670, and that this band had some structure. Spectrograms taken with a spectrograph of high dispersion, which I obtained in March of the same year, showed that the N_1 band consisted of three maxima. From my point of view, however, this fact was not regarded as anything essentially new, and the material for accurate wave-length measurements was collected for later treatment. Thus I observed the three maxima of N_1 several months before Prof. McLennan announced the fact at the International Congress of Refrigeration on June 17.

2. The essential point in our discussion is whether Prof. McLennan is right in assuming that each of the three maxima of N_1 is to be regarded as a spectral line with a definite wave-length. With regard to this point, I can refer to my previous publications and to more complete publications which are soon to appear, from which it will be evident that the maxima are moving and that the band N_1 approaches the auroral